Periodontal Disease; Diagnosis, Prevention and Treatment

Periodontal disease is due to inflammation of the periodontal tissues (periodontitis) and the resulting tissue loss and change in architecture. The tissues affected by periodontitis (periodontium) are gingiva, cementum, periodontal ligament and alveolar bone. The majority of the inflammation is due to the body’s own reaction toward plaque bacteria. Minor causes are the direct destruction by the bacteria and irritation by dental calculus and foreign materials. Thus the successful prevention is elimination of plaque.

Anatomy

The periodontal tissues are the gingiva, cementum, periodontal ligament and alveolar bone. Gingiva is a modified oral mucosa which has a higher collagen content than other oral mucosa. It should form a collar around each tooth. Gingiva has an attached and free portion. The attached gingiva is connected to the alveolar bone and most coronal portion of the tooth root and periodontal ligament. The free gingiva surrounds the most apical portion of the crown. The epithelium of the free gingiva reflects toward the tooth to form the gingival sulcus which is the normal space between the gingiva and the tooth.

The cementum covers each tooth root. It contains vital cells and connects to the periodontal ligament via Sharpey’s fibers. The periodontal ligament connects the tooth root to the alveolus and also serves as a shock absorber and has sensory functions. The periodontal ligament also has fibers which connect to the gingiva and adjacent teeth.

The alveolar bone houses the tooth and periodontal ligament and provides support for the dentition. The interior of the alveolus is cortical bone with surrounding trabecular bone.

Plaque

Plaque is bacteria housed within a protective glyccocalyx. Plaque begins as a non-vital pellicle which forms within hours of a dental cleaning. Bacteria begins to colonize this pellicle and is surrounding by a glyccocalyx biofilm. This biofilm protects the bacteria from antibiotics and antiseptics. However it can be mechanically debrided. If allowed to mature, the bacterial population shifts form gram positive aerobic bacteria to gram negative anaerobic (mainly rod) bacteria.

Calculus

When plaque is in contact with salivary minerals after 72 hours, it begins to mineralize. This mineralization is known as calculus. Supragingival calculus is called tartar. Tartar can serve as an irritant and as a plaque retentive surface.

Prevention

The key to preventing periodontal disease is to prevent periodontitis. The first stage in defense is plaque removal. Daily removal is most effective. The gold standard is daily toothbrushing. Toothbrushing is still effective if performed every other day. Brushing provides a mechanical debridement of plaque. Other mechanical means of plaque removal include diets and treats such as Greenies, Tartar Shield chews and Hill’s T/D.
Other products function by preventing plaque accumulation. These include Healthy Mouth Oravet and Sanos. Plaque accumulation may also be reduced by reducing calculus formation. This is commonly achieved through mineral chelators like polyphosphates. Regardless of plaque prevention methods, some calculus accumulation occurs. Calculus must be mechanically debrided with hand and/or power scalers. This can only be adequately performed under general anesthesia. Hand scalers are very effective, although inefficient to use alone. Hand scalers must be kept sharp or they will only burnish calculus instead of removing it. The most commonly used mechanical scalers are ultrasonic scalers. These function by turning electric energy into mechanical energy causing the tip of the scaler to vibrate with high frequency. These effectively knock calculus from the tooth. Due to the pattern and frequency of vibration the tip should not be directed toward the tooth and the scaler should not stay on a tooth for more than a few seconds at a time. Otherwise tooth damage is likely. Other mechanical scalers include sonic and rotary scalers. Sonic scalers are relatively safe, but less efficient. Rotary scalers are even less efficient and damage the teeth. Subgingival scaling and be performed with ultrasonic tips or hand curettes. Ultrasonic subgingival tips are thinner and the power setting on the scaler must be decreased to prevent damage to the softer enamel. Hand curettes are similar to hand scalers, except the tip is rounded to prevent soft tissue trauma. If used subgingivally, hand scalers can lacerate the soft tissue and cause more periodontitis. Regardless of the scaling method, microabrasions are produced in the enamel. These are removed via polishing with a prophylaxis angle and paste. Frequency of dental cleanings is dependent on three basics
• Effectiveness of home hygiene
• Individual patient anatomy/physiology/immunity
• Presence of established periodontal disease
Essentially our goal is to clean the teeth when calculus is present and before gingivitis occurs.

Assessment
Complete assessment of periodontal disease prognosis and treatment options depends on complete oral examination and dental radiographs. The complete oral examination includes periodontal probing, measurement of any gingival recession and examination of any furcation exposure, assessment of presence of gingivitis and assessment for tooth mobility as well as quantifying the amount of calculus and plaque accumulation. Dental radiographs are necessary to quantify and qualify bone loss. Examination findings should be recorded in the medical record to refer to during continued assessment.
The total of periodontal attachment loss determines the stage of periodontal disease.
• Stage 0: no inflammation or attachment loss
• Stage 1: gingivitis only without attachment loss
• Stage 2: less than 25% attachment loss
• Stage 3: 25-50% attachment loss
• Stage 4: greater than 50% attachment loss
Treatment
Stage 0 periodontal disease requires only periodontal prophylaxis including supra and subgingival scaling and polishing followed by instituting appropriate plaque control at home.
Stage 1 periodontal disease is treated as stage 0. The caveat is home care is much more important as the inflammation present may lead to periodontitis. Reassessment after six months is highly recommended to assure home care guidelines are being followed and are successful.
Stages 2 and 3 periodontal disease require treatment via dental cleaning and the associated attachment loss needs to be addressed.
If suprabony pockets are present and three millimeters of attached gingiva are present, the pocket may be treated with closed root planing (pockets less than 6mm) or open root planing (pockets greater than 6mm). Often the cleaned pocket can be treated after cleaning with a perioceutic. The most commonly used perioceutic in veterinary medicine is Doxyrobe gel, although alternatives exist.
If infrabony pockets exist, it is possible to surgically expose and debride the pocket, add a bone graft and a barrier to prevent re-epithelialization in a process known as guided tissue regeneration.
In the case root dehiscence and gingival clefts, gingival crafts can be performed to re-establish attached gingiva.
All of these advanced procedures require
• Client dedication to home hygiene an follow up
• Adequate existing periodontium to allow re-establishment
• Clinician skill and proper materials
If the client cannot or will not comply, extraction may be the best choice
Stage 4 periodontal disease requires extraction. However pre and post-operative radiographs are still required.

Systemic Health
Chronic periodontitis will affect systemic health. The full effect on canine and feline patients is not fully realized. Human data has demonstrated a positive correlation between periodontitis and the following; coronary heart disease, stroke, poor diabetes regulation, low birthweight and premature birth. Data exists which points toward a correlation between periodontitis and histopathologic changes in the kidneys, liver, papillary muscle and heart valves. Additionally there is evidence of changes on serum chemistry. It should be clear that none of this establishes a causative relationship. However anecdotal reports speak to improved patient well being after full periodontal therapy.

References available upon request